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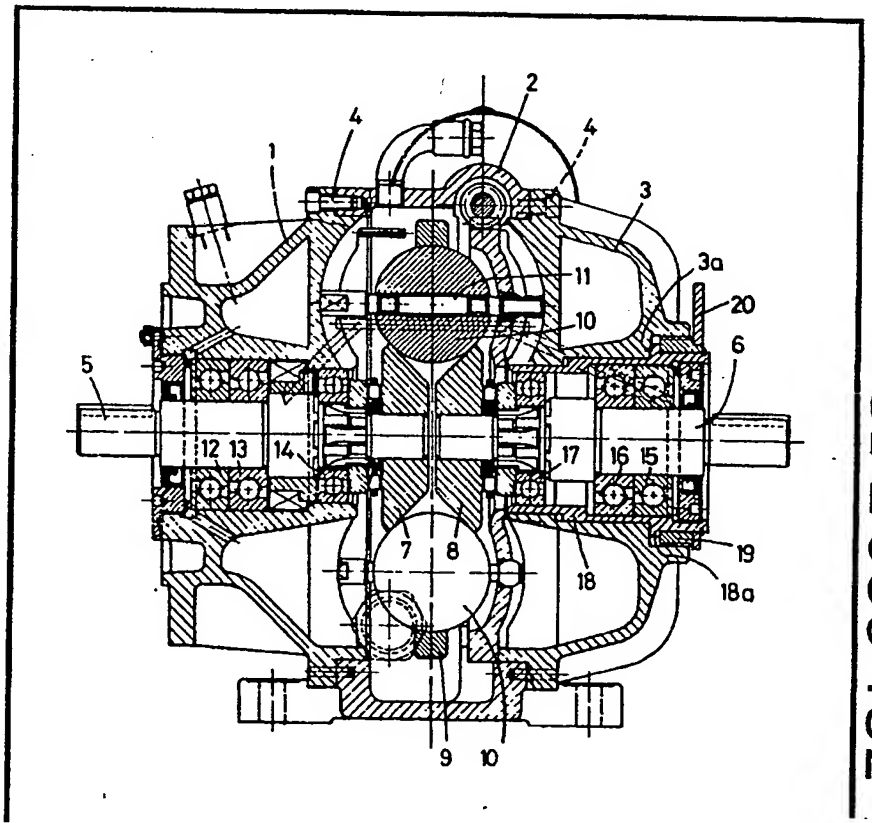
# (54) Infinitely variable friction drive

(57) In an infinitely variable friction drive, the bearing means (15, 16, 17) of one of the shafts (6) are enclosed within a sleeve (18) which can be adjusted, e.g. by means of a screw connection (19) to the part of the housing in which it is accommodated. The adjustment displaces the sleeve from a stop position, in which a friction-tight fit in the speed control is ensured, to a position in which the transmission ratio can easily be varied at will even when the shafts are at a standstill.

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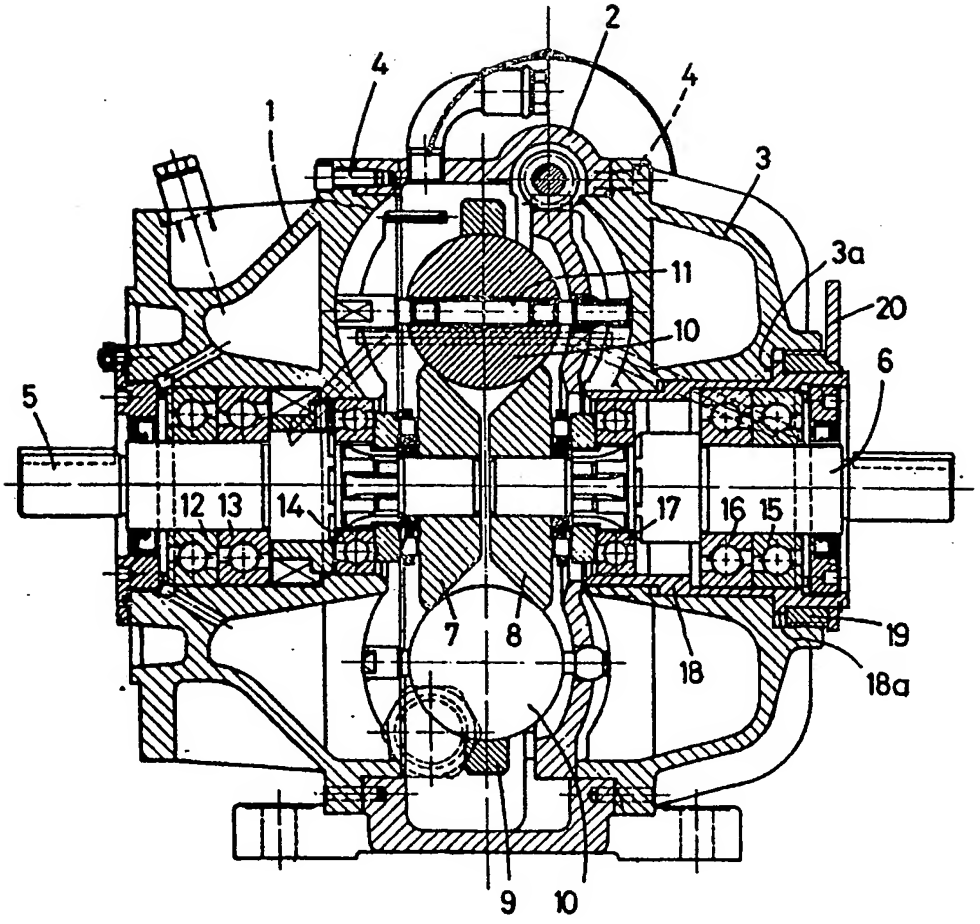
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SPECIFICATION

## Infinitely variable speed friction drive

This invention relates to an infinitely variable speed friction drive of the type wherein a driving shaft and a driven shaft are supported within a housing, adjacent ends of the shafts each having a friction wheel secured thereto, the two friction wheels being held in a driving relationship to one another during operation by means of friction members rotatable about their own axes, and the friction members being displaceable for the purpose of varying the transmission ratio.

Infinitely variable speed friction drivers of this type have already been designed in many ways, including designs in which the friction members are substantially spherical, the angle of inclination of their own axes to the common axis of the two shafts and friction wheels being varied in order to vary the transmission ratio. In all of the known designs, however, this variation can take place only during running since care is always taken to ensure that an adequate friction-tight fit is already provided between the friction members and the friction wheels during standstill, even though it is additionally ensured in most designs that this friction-tight fit automatically adapts during operation to the magnitude of the torque to be transmitted.

Thus there is a need for an infinitely variable speed friction drive in which it is possible, at low additional construction cost, to eliminate the aforementioned friction-tight fit when the shafts are at a standstill so that the transmission ratio may be varied at will even during standstill.

According to the present invention, there is provided an infinitely variable speed friction drive of the type initially described, wherein all of the bearing means supporting one of the shafts and an associated rotor are enclosed within a sleeve capable of being withdrawn from an operating position in which a friction-tight fit between the friction wheels and the friction members is ensured, such withdrawal eliminating the friction-tight and thus enabling displacement of the friction members while the shafts are at a standstill.

A preferred embodiment of the invention will now be described in detail, by way of example, with reference to the accompanying drawing, the sole figure of which is a longitudinal section through an infinitely variable speed friction drive according to the present invention.

The friction drive illustrated in the drawing comprises a housing having parts 1, 2, and 3 secured to one another by means of screws 4. Two coaxial shafts 5 and 6, one of which is the driving shaft and the other the driven friction surfaces. Situated within a supporting ring 9 is a circle of spherical friction members 10 which, during operation of the speed control, rest against the aforementioned friction surfaces and rotate about their own axes on spindles 11; for the purpose of varying the transmission ratio of the infinitely variable speed friction drive, the angle of inclination of the spindles 11 to the common axis of the shafts 5 and 6 can be adjusted by means well known to those skilled in the art.

Bearing means 12, 13, and 14 supporting the shaft 5 are built directly into the housing part 1 in a conventional manner. In contrast thereto, similar bearing means 15, 16 and 17 supporting the shaft 6 are enclosed within a sleeve 18 which is mounted for rotation and axial displacement in the housing part 3 and includes an annular flange 18*a*. When resting against an annular shoulder 3*a* of the housing part 3, the flange 18*a* determines the axial position of the sleeve 18, and thus of the shaft 6 as well, in which the friction-tight fit between the friction members 10 and the friction wheels 7 and 8 is ensured. Fixed to the sleeve 18 immediately adjacent to the annular flange 18*a* is a screw ring 19 to which an adjusting member 20 is secured. The external thread of the screw ring 19—preferably a five-pitch coarse thread, for example—engages a matching internal thread of the housing part 3, so that the sleeve 18 need be rotated by only 30°, for instance, in order to eliminate the friction-tight fit between the friction members 10 and the friction wheels 7 and 8, and thus the transmission ratio of the speed control can then be varied when the shafts 5 and 6 are at a standstill.

A design would also be conceivable in which the sleeve 18 would be adjusted, not by screwing, but e.g. by hydraulic means, the annular flange 18*a* operating as an annular piston, for example. However, such embodiment would be more expensive and less reliable in operation.

CLAIMS

1. An infinitely variable friction drive wherein a driving shaft and a driven shaft are supported within a housing, adjacent ends of the shafts each having a friction wheel secured thereto, the two friction wheels being held in a driving relationship to one another during operation by means of friction members rotatable about their own axes, and the friction members being displaceable for the purpose of varying the transmission ratio, characterized in that all of the bearing means supporting one of the shafts and an associated rotor are enclosed within a sleeve capable of being withdrawn from an operating position in which a friction-tight fit between the friction wheels and the friction members is

of the friction members while the shafts are at a standstill.

2. An infinitely variable friction drive in accordance with claim 1, characterized in that a preferably multi-pitch screw connection exists between the sleeve and the respective part of the housing.

3. An infinitely variable friction drive substantially as hereinbefore described with reference to the accompanying drawing.

4. Any novel feature or combination of features disclosed herein.

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